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BIODIVERSITY OF SOUTHWESTERN AFRICAN FUNGI: INTERACTIONS WITH HIGHER PLANTS, FUNCTIONAL DIVERSITY AND DNA-TAXONOMY

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Abstract:
Our project aims to ascertain data on the biodiversity and ecology of soil fungi, arbuscular mycorrhizae, and plant parasitic rust fungi in important biomes of southwestern Africa. During a first trip to Namibia in March 2001, samples were taken on the observatories Mile 46, Sovo, Sonop 903, Otjiamongombe, Toggekry 250, Gellap Ost 3 and Nabaos 7. First observations and results from this trip are presented here.

Results:
Soil samples examined for the presence of arbuscular mycorrhizal spores revealed differences in the number of spores and – although species identification is still pending – species composition. The dominating spore type in the north (Mile 46 and Sovo) is a small, dark brown *Glomus*-spore, in the thornbush savanna (Otjiamongombe, Toggekry 250) a light brown *Glomus*-spore and in the south (Gellap Ost 3 and Nabaos 7) a small, yellowish-brown *Glomus*-spore. The dominance of *Glomus*-spores is in accordance with the reports by Stutz et al. (1). The number of spores is within the range reported in previous studies from comparable ecosystems (2, 3).
Root samples stained for the presence of arbuscular mycorrhizal fungi were mainly found to be mycorrhizal with the exception of Poaceae in Nabaos 7. As spores were present in soil samples near the plants from which the non-mycorrhizal roots were taken, this warrants further attention. Molecular studies (especially on the samples from Nabaos 7) are under way to check for the presence of non-staining mycorrhizal fungi and to verify the results obtained by microscopic techniques.
The soil samples that were examined for arbuscular mycorrhiza were used for the study of soil fungi as well. Following the procedure of Gams & Domsch (4) the samples were washed with 6 l of water and transferred to isolation media. Over thousand cultures of soil fungi were isolated. A part of the species is already identified, but identification of most isolates is still pending. So far, the isolates that have been identified belong to 20 genera; eight genera seem to be new to Namibia.
The preliminary results confirm the impression gained during the study of arbuscular mycorrhiza, that Gellap Ost 3 and Nabaos 7 are different from the other areas. From the soil in Gellap Ost 3 and Nabaos 7, fewer fungi were isolated. The number of Zygomycetes is especially low, possibly due to the lack of organic litter. The dominating isolate was a Coelomycete. However, in this area samples were taken before the onset of the raining

season, while the raining season in the other areas was well under way. Therefore, further sampling is necessary to compare the areas under the same water conditions.
Our work on rust fungi in Namibia aims to contribute to the rust mycota of selected biodiversity observatories and the whole country.
The knowledge about Namibian rust fungi is extremely scanty and mostly derived from the works of Ethel Doidge in southern Africa (e.g. 5). Although the Namibian flora comprises ca. 4.000 species of higher plants (6) our extensive literature search revealed only 13 species of rust fungi (comp. Tab. 1). This species number is extremely low compared with figures available for other African countries [e.g. South Africa ca. 400 (7), Uganda 294 species (8)].
A first species inventory of the BIOTA observatories in 2001 indicates that a considerably higher number of rusts can be expected to occur in Namibia.

Tab. 1: Rust species hitherto reported for Namibia (compiled from literature)

Rust fungi	**Host/Family**	**Host/Species**
Aecidium acanthopsidis H. & P. Sydow	Acanthaceae	*Acanthopsis sp.* Harv.
Aecidium clarum Sydow	Iridaceae	*Ferraria viscaria* Schinz
Aecidium dinteri Doidge	Mimosaceae	*Acacia uncinata* Engl.
Aecidium lebeckiae P. Hennings	Fabaceae	*Lebeckia simsiani* E. & Z.
Aecidium talinophilum P. & H. Sydow	Portulacaceae	*Talinum caffrum* (Thunb.) Eckl. & Zeyh.
Puccinia desertorum Sydow	Convolvulaceae	*Evolvulus alsinoides* (L.) L.
Puccinia chaseana Arth. & Fromme	Poaceae	*Anthephora schinzii* Hack.
Puccinia galeniae Dietel	Aizoaceae	*Galenia africana* L. *Galenia sarcophylla* Fenzl.
Puccinia sorghi Schwein. Syn.: ***Puccinia maydis*** Bereng. Syn.: ***Aecidium oxalidis*** Thuem.	Poaceae Oxalidaceae	*Zea mays* *Oxalis obtusa* Jacq.
Uredo augeae H. & P. Sydow	Zygophyllaceae	*Augea capensis* Thunb.
Uromyces comptus H. & P. Sydow	Convolvulaceae	*Merremia bipinnatipartita* (Engl.) Hallier f.
Uromyces saginatus Sydow	Hyacinthaceae	*Drimia altissima* (L.f) Ker Gawl.
Uromyces trollipi Kalchbr. & MacOwan	Zygophyllaceae	*Zygophyllum* sp. L.

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